Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A space-time encoding and decoding method for a frequency selective fading channel, comprising:

A. taking, by an encoder, two independent data fields of a time slot in input data as a processing unit with space-time orthogonal encoding method, encoding them and generating two data vectors, thereby forming two diversity signals, and transmitting said two diversity signals simultaneously with each through a corresponding diversity antenna;

B. receiving, by a terminal, said two diversity signals, and neglecting mutual interference between said two diversity signals caused by non-orthogonality;

C. performing, by said terminal, joint detection that only [[taking]]takes into account affect to said two diversity signals from multipath interference and multi-user interference, thereby obtaining a decoding result; and

D. implementing interference cancellation based on a result of said joint detection to remove interference between said two diversity signals, and then returning to step C to implement iteration for decoding processing.

2. (Previously Presented) The method of claim 1, wherein said two diversity signals in step A are transmitted through two diversity beams of one smart antenna respectively and simultaneously.

3. (Original) The method of claim 1, further comprising the step of predefining number of iteration times to determine execution times from step C to step D and from step D to step C again.

4. (Previously Presented) The method of claim 1, wherein step B comprises: setting the upper right block and the lower left block of a matrix

$\mathbf{A}^{*T}\mathbf{A} = \begin{bmatrix} \mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^* & \left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2 \\ \left(\left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2\right)^{*T} & \left(\mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^*\right)^* \end{bmatrix}$ to be null matrixes, and then calculating

equation $\hat{\mathbf{d}}_t = (\mathbf{B})^{-1}\mathbf{A}^{*T}\mathbf{r}$ to obtain a simplified equation for joint detection; wherein $\mathbf{A}_1$ and $\mathbf{A}_2$ are system matrixes of signal transmission between first and second transmitting antennas and receiving antennas; **A** and **B** are matrixes; $\hat{\mathbf{d}}_t$ is a value of continuous estimation of a receiving data field; **r** is a sample value of said receiving data field; T denotes a transpose operation; * denotes conjugate;

said joint detection in step C is calculated based on a simplified joint detection equation:

$\begin{cases} \hat{\mathbf{d}}(1) & = & \mathbf{B}_S^{-1}\left(\mathbf{A}_1^{*T}\mathbf{r}_1 + \left(\mathbf{A}_2^{*T}\mathbf{r}_2\right)^*\right) \\ \hat{\mathbf{d}}(2) & = & \mathbf{B}_S^{-1}\left(\mathbf{A}_1^{*T}\mathbf{r}_2 - \left(\mathbf{A}_2^{*T}\mathbf{r}_1\right)^*\right) \end{cases}$, wherein $\hat{\mathbf{d}}(1)$ and $\hat{\mathbf{d}}(2)$ are values of continuous estimation of two receiving data fields, $\mathbf{B}_S$ is a matrix; $\mathbf{r}_1$ and $\mathbf{r}_2$ are sample values of two receiving data fields;

the step of implementing interference counteraction based on the result of said joint detection in step D further comprising:

D1. subtracting affect of a data field $\mathbf{d}(1)$ from received data signal based on the following formula,

$$\begin{cases} \mathbf{r}_1' & = & \mathbf{r}_1 - \mathbf{A}_1\widehat{\mathbf{d}}(1) \\ \mathbf{r}_2' & = & \mathbf{r}_2 - \mathbf{A}_2\widehat{\mathbf{d}}^*(1) \end{cases}$$

thereby obtaining $\mathbf{r}_1'$ and $\mathbf{r}_2'$;

subtracting affect of another data field $\mathbf{d}(2)$ from received data signal based on the following formula:

$$\begin{cases} \mathbf{r}_1'' & = & \mathbf{r}_1 + \mathbf{A}_2\widehat{\mathbf{d}}^*(2) \\ \mathbf{r}_2'' & = & \mathbf{r}_2 - \mathbf{A}_1\widehat{\mathbf{d}}(2) \end{cases}$$

thereby obtaining $\mathbf{r}_1''$ and $\mathbf{r}_2''$;

D2. substituting $\mathbf{r}_1'$ and $\mathbf{r}_2'$ for $\mathbf{r}_1$ and $\mathbf{r}_2$ in the second equation of said simplified joint detection formula used in step C, and substituting $\mathbf{r}_1''$ and $\mathbf{r}_2''$ for $\mathbf{r}_1$ and $\mathbf{r}_2$ in the first equation of said simplified joint detection formula used in step C, calculating said simplified joint detection formula, thereby obtaining iteration results of $\hat{\mathbf{d}}\mathbf{(1)}$ and $\hat{\mathbf{d}}\mathbf{(2)}$.

5. (Original) The method of claim 4, wherein said matrix **B** is calculated by one of the following formulas:

$$\mathbf{B} = \begin{cases} \mathbf{I} \\ \mathbf{A}^{*\mathrm{T}}\mathbf{A} \\ \mathbf{A}^{*\mathrm{T}}\mathbf{A} + \sigma^2\mathbf{I} \end{cases}$$

these formulas including match filter scheme, zero-forcing block equalization scheme and minimum mean-square-error block equalization scheme; wherein σ^2 is noise power, and **I** is an identity matrix;

said matrix $\mathbf{B}_\mathrm{S}$ is calculated by one of the following formulas:

$$\mathbf{B}_\mathrm{S} = \begin{cases} \mathbf{I} \\ \mathbf{A}_1^{*\mathrm{T}}\mathbf{A}_1 + \left(\mathbf{A}_2^{*\mathrm{T}}\mathbf{A}_2\right)^* \\ \mathbf{A}_1^{*\mathrm{T}}\mathbf{A}_1 + \left(\mathbf{A}_2^{*\mathrm{T}}\mathbf{A}_2\right)^* + \sigma^2\mathbf{I} \end{cases}$$

these formulas including match filter scheme, zero-forcing block equalization scheme and minimum mean-square-error block equalization scheme; wherein σ^2 is noise power, and **I** is an identity matrix.

6. (Original) The method of claim 4, wherein said system matrixes $\mathbf{A}_1$ and $\mathbf{A}_2$ are determined by channel pulse response and user transmission waveform.

7. (Previously Presented) The method of claim 1, wherein said neglecting mutual interference between said two diversity signals caused by non-orthogonality comprises:

setting, in a matrix $\mathbf{A}^{*T}\mathbf{A}$ which equals $\begin{bmatrix} \mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^* & \left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2 \\ \left(\left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2\right)^{*T} & \left(\mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^*\right)^* \end{bmatrix}$, the upper right block $\left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2$ and the lower left block $\left(\left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2\right)^{*T}$ to null, wherein $\mathbf{A} = \begin{bmatrix} \mathbf{A}_1 & -\mathbf{A}_2 \\ \mathbf{A}_2^* & \mathbf{A}_1^* \end{bmatrix}$, and $\mathbf{A}_i$ is the system matrix of the signal transmission between the ith transmitting antenna and receiving antenna.

8. (Previously Presented) A space-time encoding method for a frequency selective fading channel, comprising:

taking, by an encoder, two independent data fields of a time slot in input data as a processing unit with space-time orthogonal encoding method, encoding the two independent data fields and generating two data vectors, thereby forming two diversity signals, and transmitting said two diversity signals simultaneously with each through a corresponding diversity antenna.

9. (Previously Presented) The method of claim 8, wherein said two diversity signals are transmitted through two diversity beams of one smart antenna respectively and simultaneously.

10. (Previously Presented) A space-time decoding method for a frequency selective fading channel, comprising:

A. receiving, by a terminal, two diversity signals, and neglecting mutual interference between said two diversity signals caused by non-orthogonality, wherein said two diversity signals are obtained by encoding two independent data fields of a time slot with space-time orthogonal encoding method and are transmitted simultaneously with each through a corresponding diversity antenna;

B. performing joint detection, by said terminal, neglecting mutual interference between said two diversity signals caused by non-orthogonality, thereby obtaining a decoding result; and

C. implementing interference counteraction based on a result of said joint detection to remove interference between said two diversity signals, and then returning to step B to implement iteration for decoding processing.

11. (Previously Presented) The method of claim 10, further comprising:

predefining the number of iteration times for determining execution times from step B to step C and from step C to step B again.

12. (Previously Presented) The method of claim 10, wherein step A comprises: setting the upper right block and the lower left block of a matrix

$$\mathbf{A}^{*T}\mathbf{A} = \begin{bmatrix} \mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^* & \left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2 \\ \left(\left(\mathbf{A}_1^{*T}\mathbf{A}_2\right)^T - \mathbf{A}_1^{*T}\mathbf{A}_2\right)^{*T} & \left(\mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^*\right)^* \end{bmatrix}$$ to be null matrixes, and then calculating

equation $\hat{\mathbf{d}}_t = (\mathbf{B})^{-1}\mathbf{A}^{*T}\mathbf{r}$ to obtain a simplified equation for joint detection; wherein $\mathbf{A}_1$ and $\mathbf{A}_2$ are system matrixes of signal transmission between first and second transmitting antennas and receiving antennas; $\mathbf{A}$ and $\mathbf{B}$ are matrixes; $\hat{\mathbf{d}}_t$ is a value of continuous estimation of a receiving data field; $\mathbf{r}$ is a sample value of said receiving data field; T denotes a transpose operation; * denotes conjugate;

said joint detection in step F is calculated based on a simplified joint detection equation:

$$\begin{cases} \hat{\mathbf{d}}(1) = \mathbf{B}_S^{-1}\left(\mathbf{A}_1^{*T}\mathbf{r}_1 + \left(\mathbf{A}_2^{*T}\mathbf{r}_2\right)^*\right) \\ \hat{\mathbf{d}}(2) = \mathbf{B}_S^{-1}\left(\mathbf{A}_1^{*T}\mathbf{r}_2 - \left(\mathbf{A}_2^{*T}\mathbf{r}_1\right)^*\right) \end{cases}$$, wherein $\hat{\mathbf{d}}(1)$ and $\hat{\mathbf{d}}(2)$ are values of continuous estimation of two receiving data fields, $\mathbf{B}_S$ is a matrix; $\mathbf{r}_1$ and $\mathbf{r}_2$ are sample values of two receiving data fields;

the step of implementing interference counteraction based on the result of said joint detection in step C further comprising:

C1. subtracting affect of a data field $\mathbf{d(1)}$ from received data signal based on the following formula,

$$\begin{cases} \mathbf{r}_1' &= \mathbf{r}_1 - \mathbf{A}_1\hat{\mathbf{d}}(1) \\ \mathbf{r}_2' &= \mathbf{r}_2 - \mathbf{A}_2\hat{\mathbf{d}}^*(1) \end{cases}$$

thereby obtaining $\mathbf{r}_1'$ and $\mathbf{r}_2'$; subtracting affect of another data field $\mathbf{d(2)}$ from received data signal based on the following formula:

$$\begin{cases} \mathbf{r}_1'' &= \mathbf{r}_1 + \mathbf{A}_2\hat{\mathbf{d}}^*(2) \\ \mathbf{r}_2'' &= \mathbf{r}_2 - \mathbf{A}_1\hat{\mathbf{d}}(2) \end{cases}$$

thereby obtaining $\mathbf{r}_1''$ and $\mathbf{r}_2''$;

C2. substituting $\mathbf{r}_1'$ and $\mathbf{r}_2'$ for $\mathbf{r}_1$ and $\mathbf{r}_2$ in the second equation of said simplified joint detection formula used in step B, and substituting $\mathbf{r}_1''$ and $\mathbf{r}_2''$ for $\mathbf{r}_1$ and $\mathbf{r}_2$ in the first equation of said simplified joint detection formula used in step B, calculating said simplified joint detection formula, thereby obtaining iteration results of $\hat{\mathbf{d}}(1)$ and $\hat{\mathbf{d}}(2)$.

13. (Previously Presented) The method of claim 12, wherein said matrix **B** is calculated by one of the following formulas:

$$\mathbf{B} = \begin{cases} \mathbf{I} \\ \mathbf{A}^{*T}\mathbf{A} \\ \mathbf{A}^{*T}\mathbf{A} + \sigma^2\mathbf{I} \end{cases}$$

these formulas including match filter scheme, zero-forcing block equalization scheme and minimum mean-square-error block equalization scheme; wherein σ^2 is noise power, and **I** is an identity matrix;

said matrix $\mathbf{B}_S$ is calculated by one of the following formulas:

$$\mathbf{B}_S = \begin{cases} \mathbf{I} \\ \mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^* \\ \mathbf{A}_1^{*T}\mathbf{A}_1 + \left(\mathbf{A}_2^{*T}\mathbf{A}_2\right)^* + \sigma^2\mathbf{I} \end{cases}$$

these formulas including match filter scheme, zero-forcing block equalization scheme and minimum mean-square-error block equalization scheme; wherein σ^2 is noise power, and **I** is an identity matrix.

14. (Previously Presented) The method of claim 12, wherein said system matrixes $\mathbf{A}_1$ and $\mathbf{A}_2$ are determined by channel pulse response and user transmission waveform.